

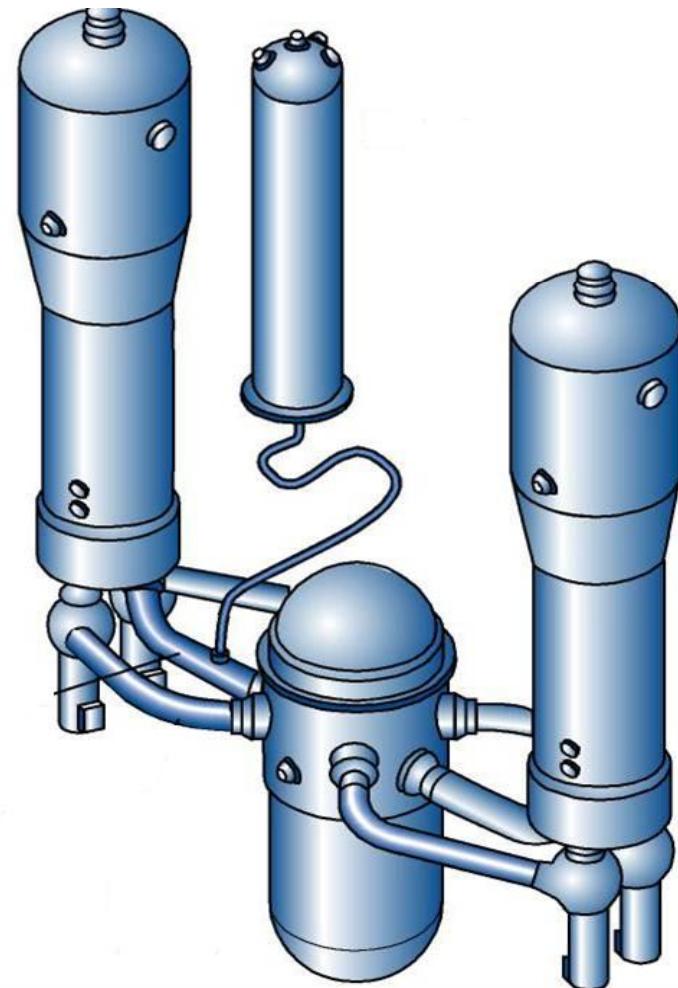


United States Nuclear Regulatory Commission

Protecting People and the Environment

Reactor Coolant System

AP1000 Technology Chapter 3.0



Objectives

1. Describe the arrangement of the reactor coolant system for the AP1000 design.
2. Describe the major differences between the reactor coolant systems of the AP1000 and currently operating Westinghouse plants.
3. State the purposes of the automatic depressurization system.

Major Components:

- Reactor vessel**
- SGs**
- RCPs**
- Pressurizer**
- Hot legs**
- Cold legs**
- PZR surge line**

Fig. 3-1

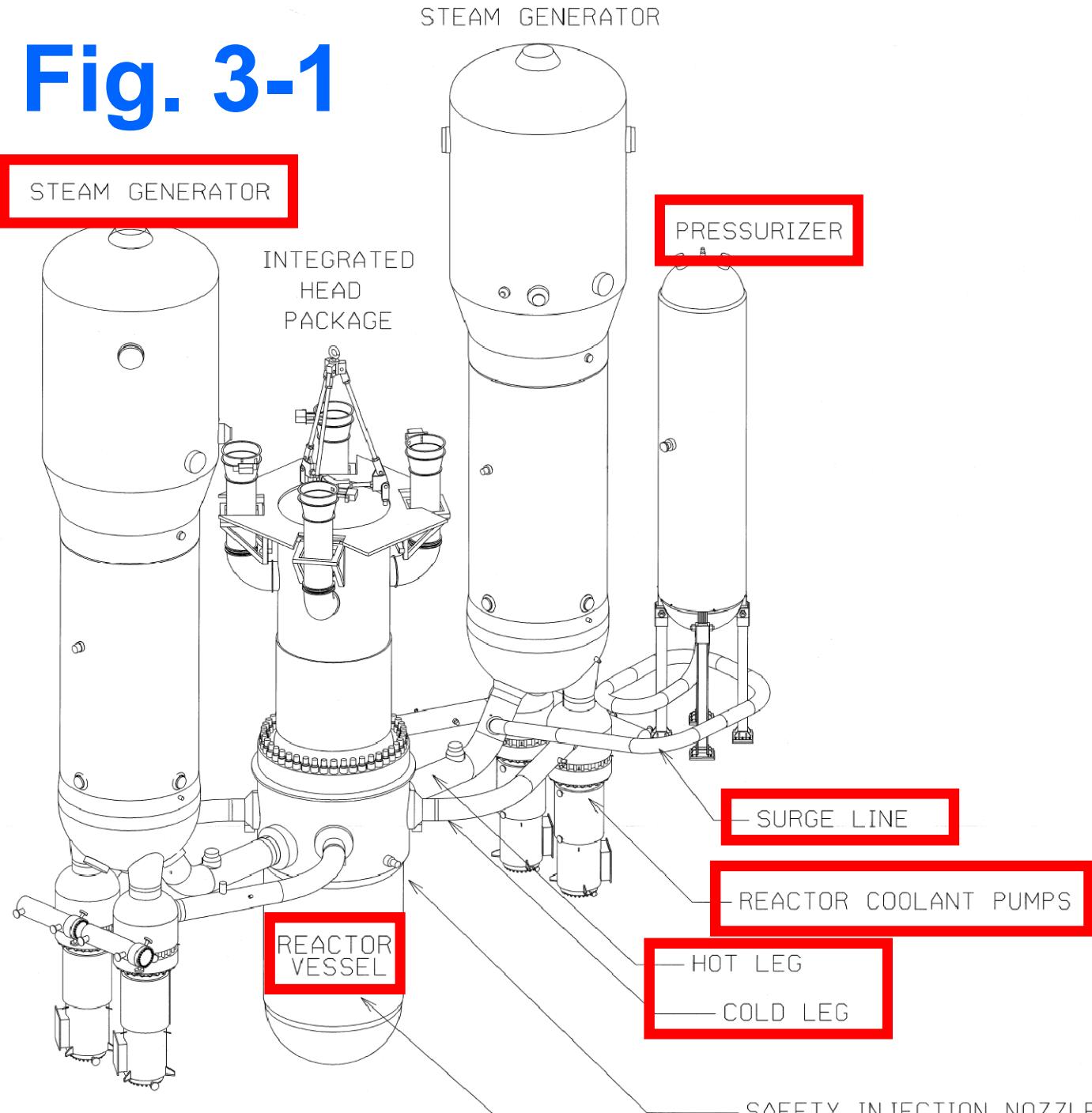


Fig. 3-2

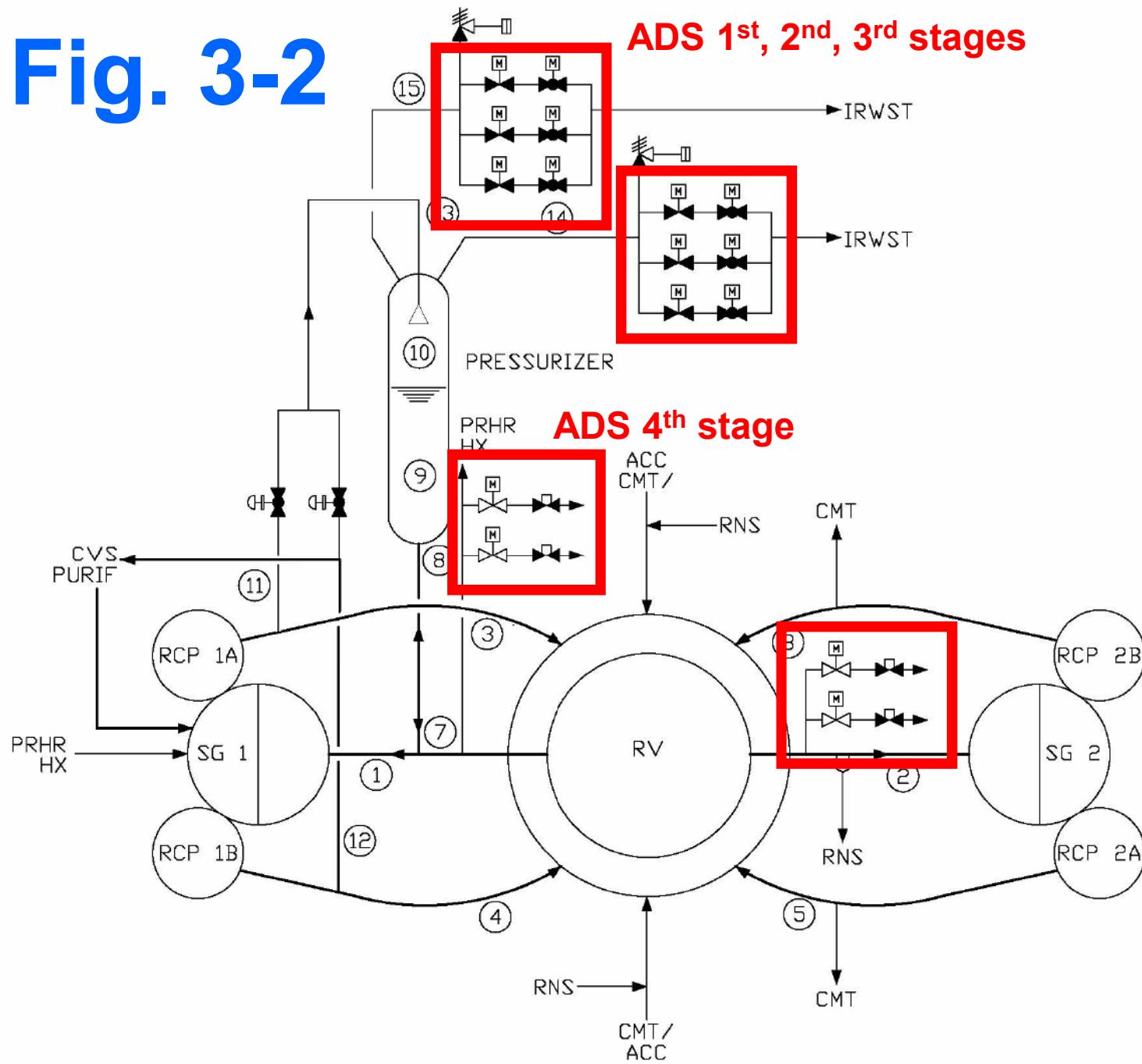
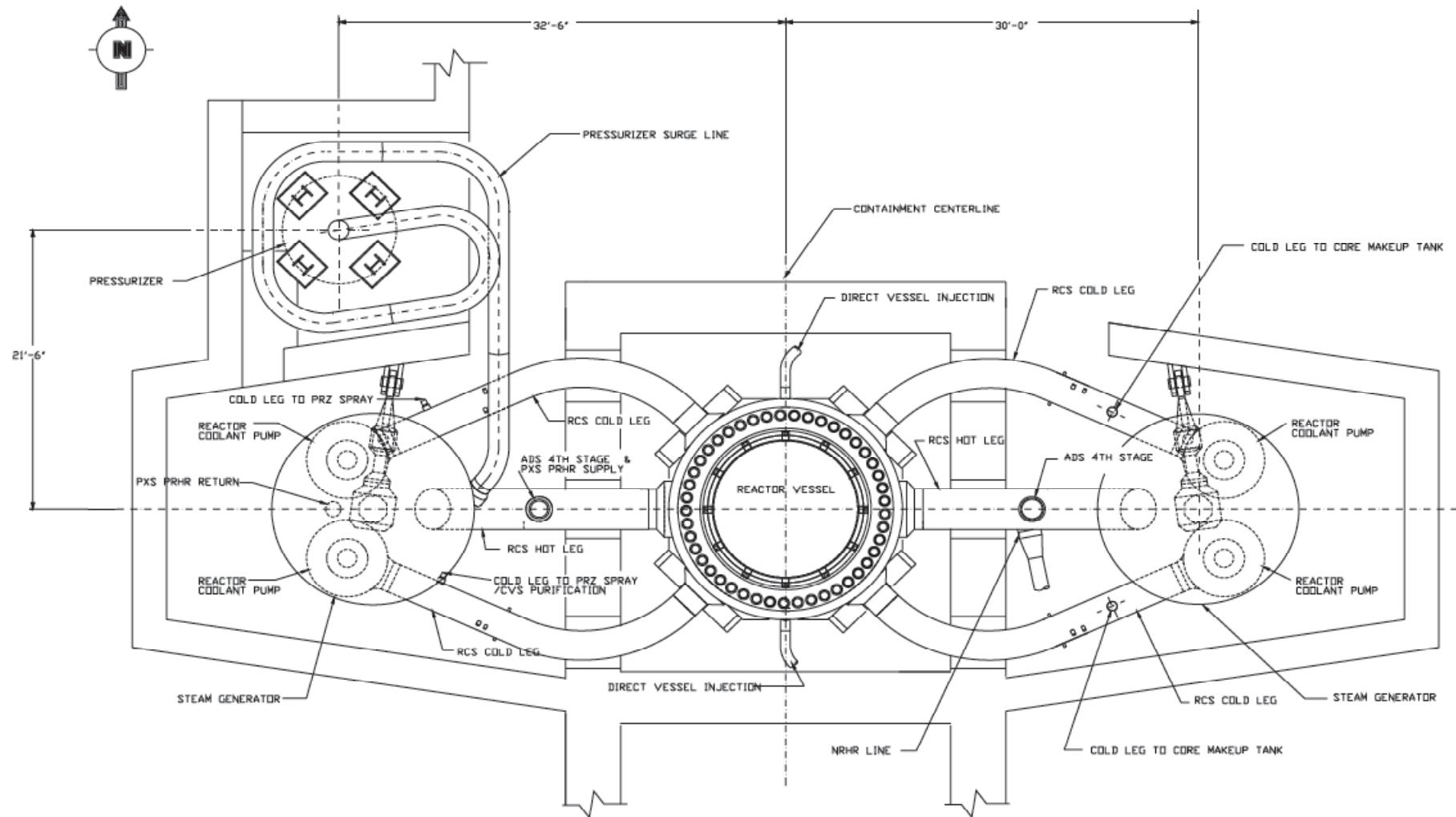


Fig. 3-3



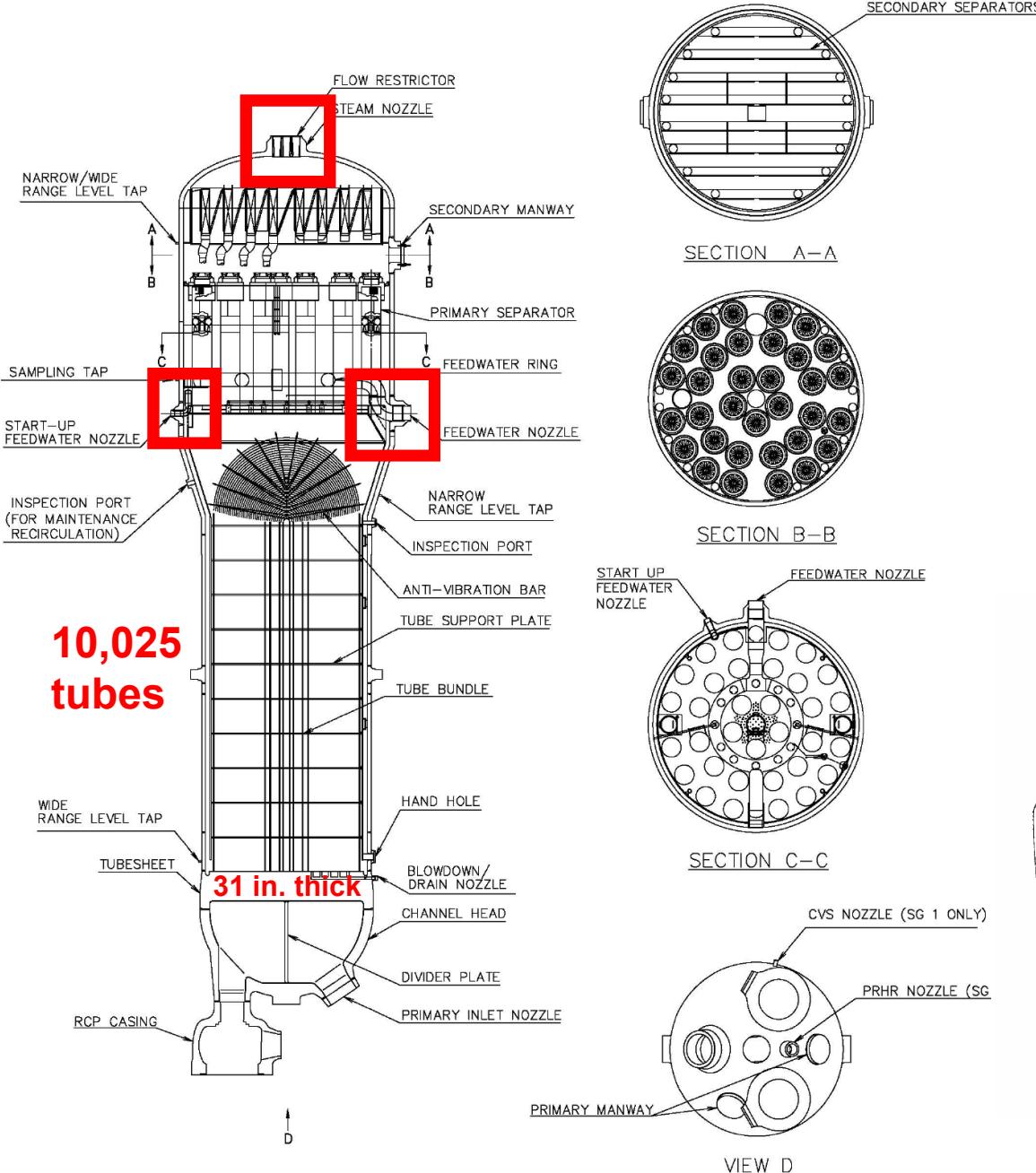
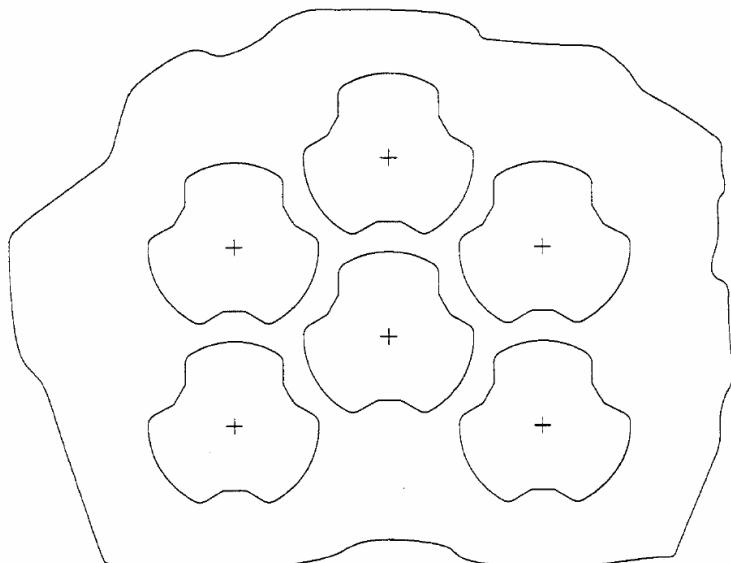
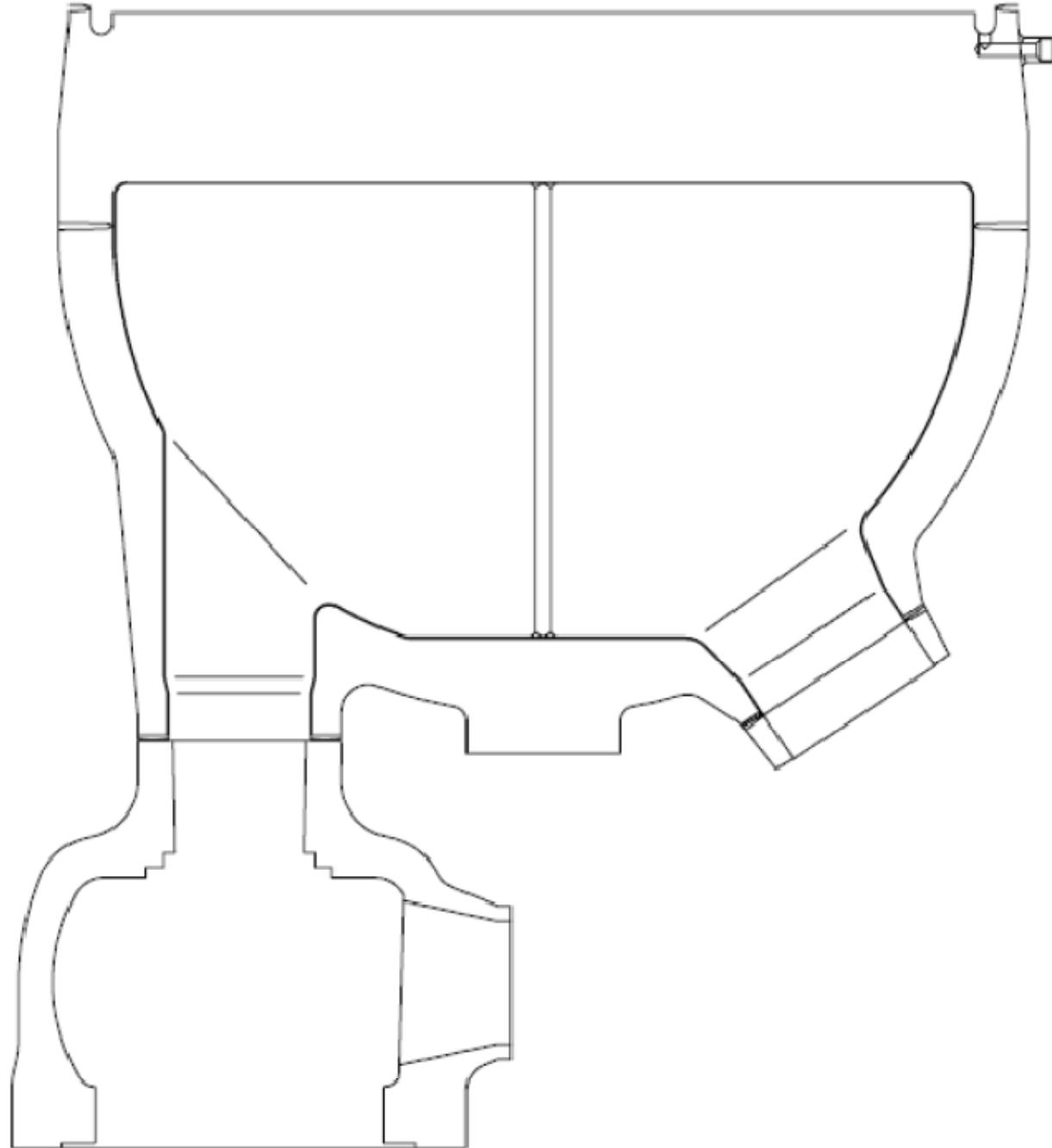


Fig. 3-5 SG

- Alloy 690 tubes
- Trifoil tube support plates (Fig. 3-6)
- Main & SU FW nozzles
- Built-in flow restrictor





RCP pump casings are welded to SG channel head during SG fabrication.

Loop Piping Connection at SG

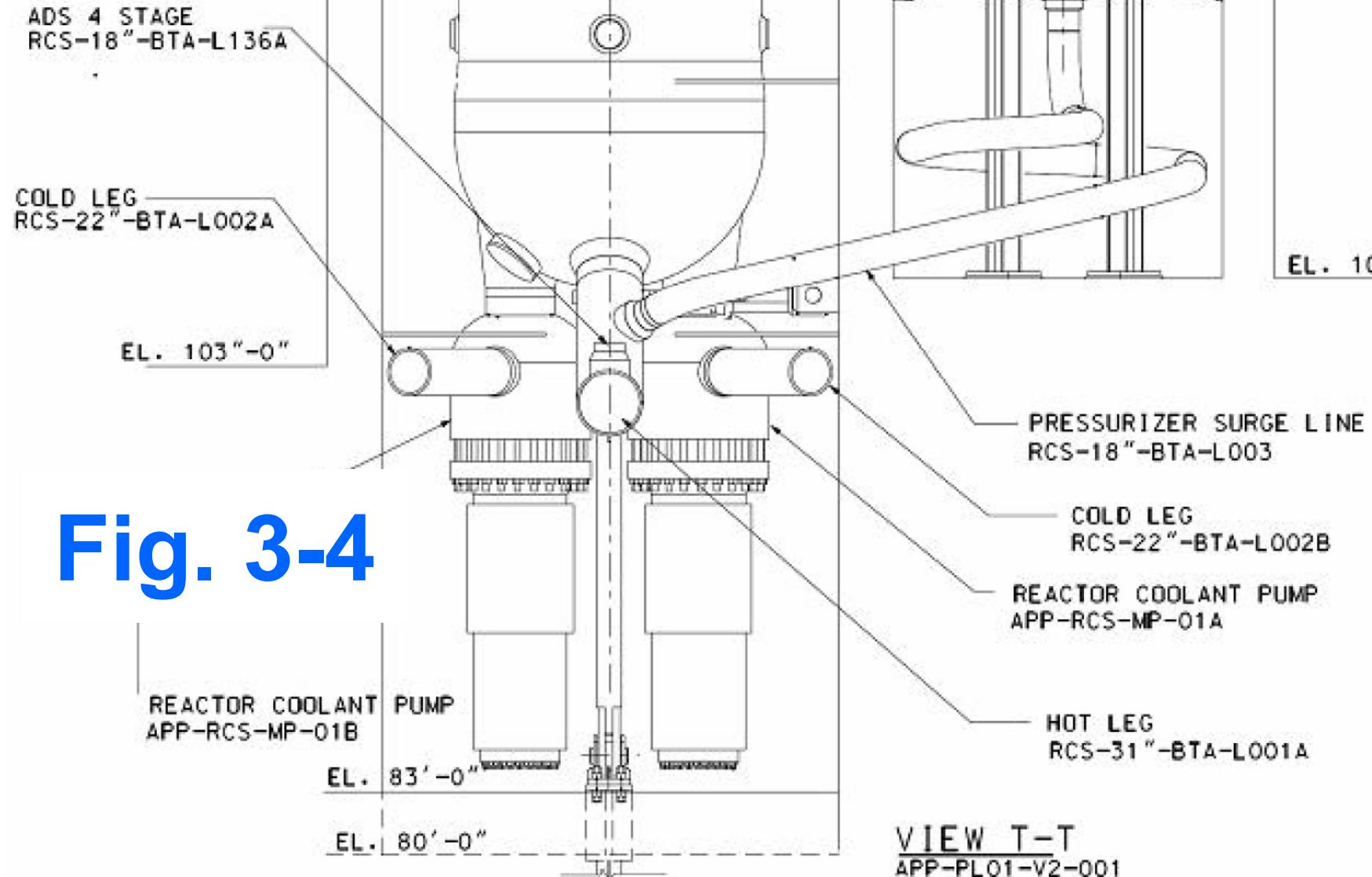
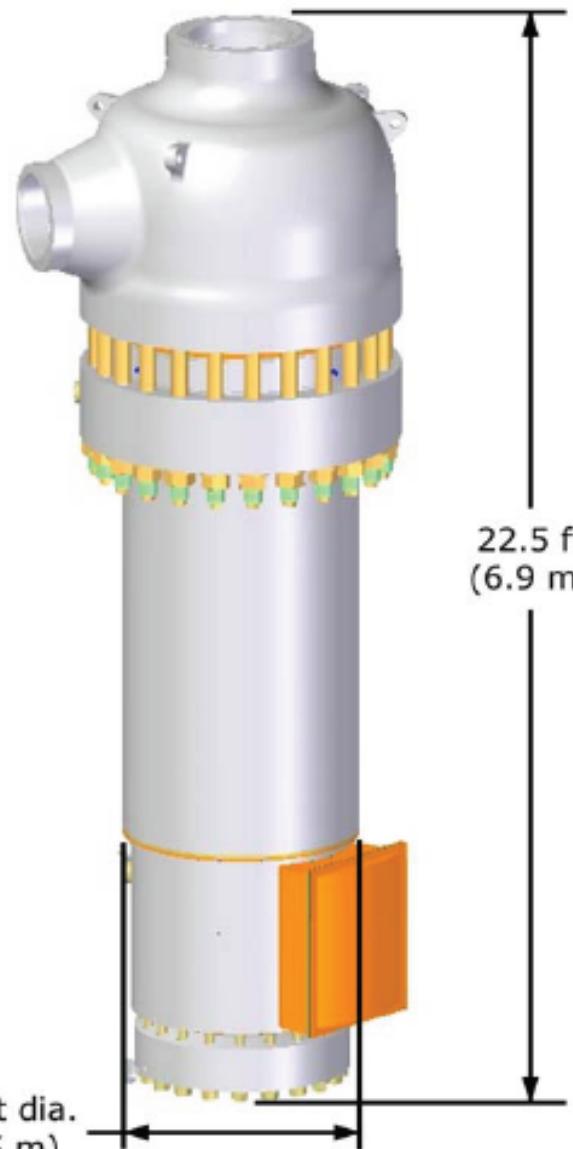
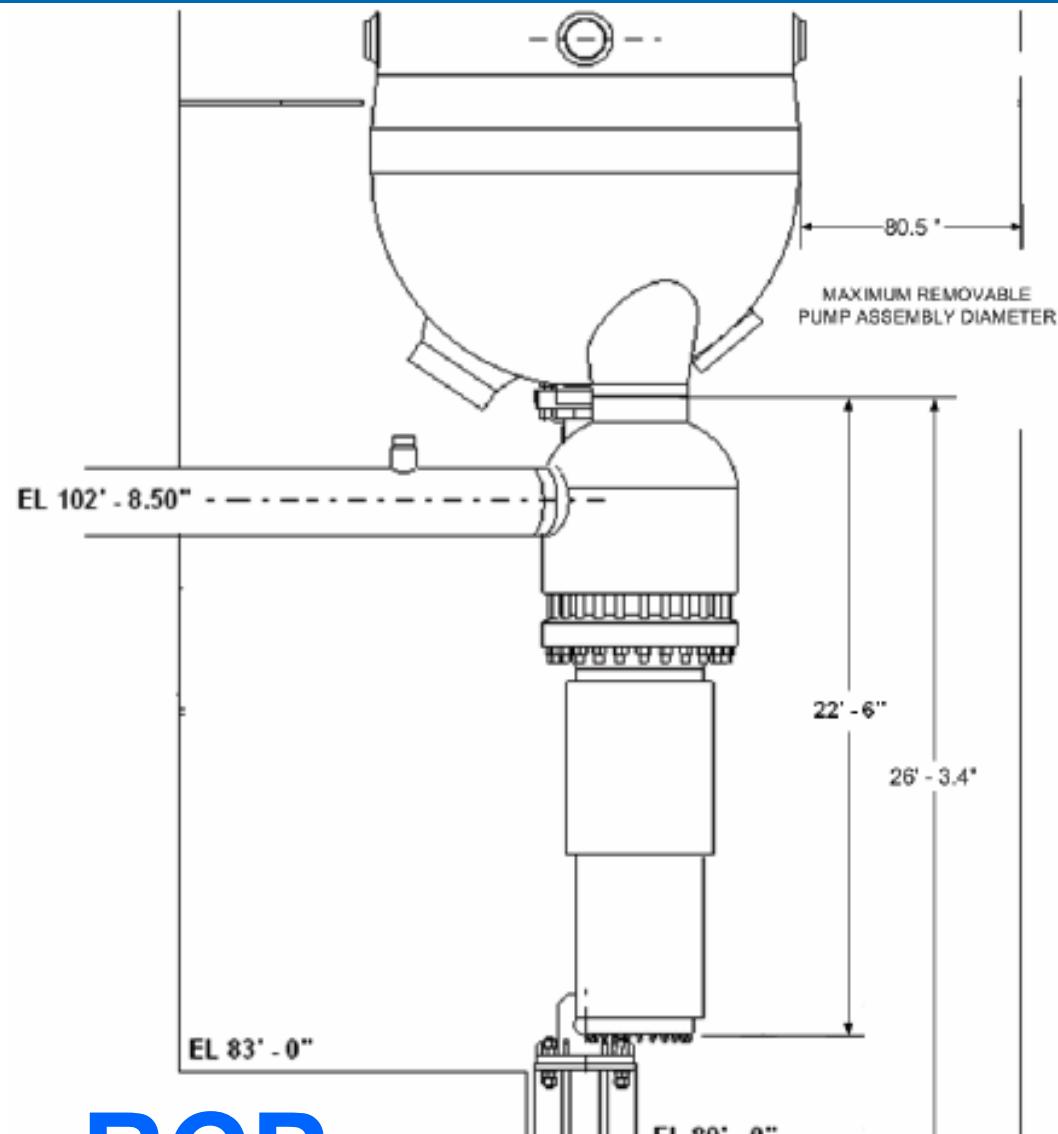


Fig. 3-4



200,850 lbs per pump
(91,106 kg)



RCP

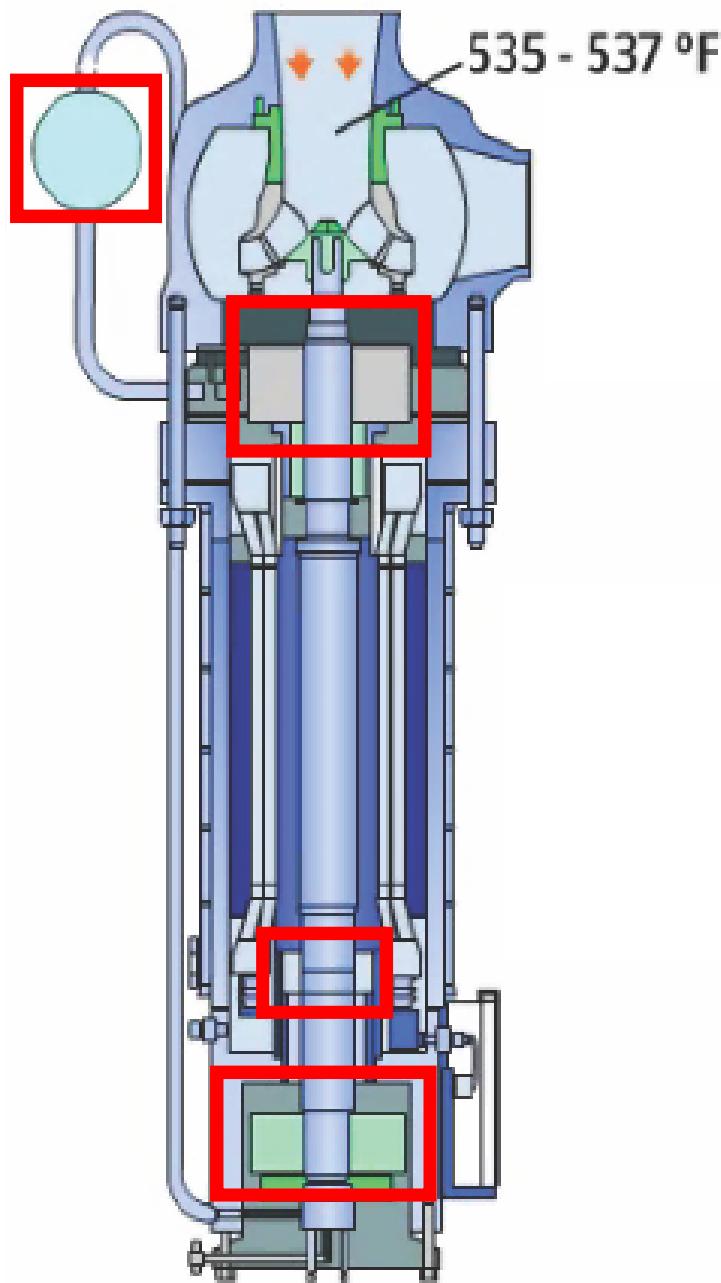


Fig. 3-7 RCP

- Centrifugal canned-motor pump (no seals)
- Welded directly to 1 of 2 SG outlet nozzles
- Aux. impeller circulates coolant through motor & then to external HX
- CCW supplied to external HX & stator cooling jacket
- 2 flywheel assemblies
- Variable speed during SUs

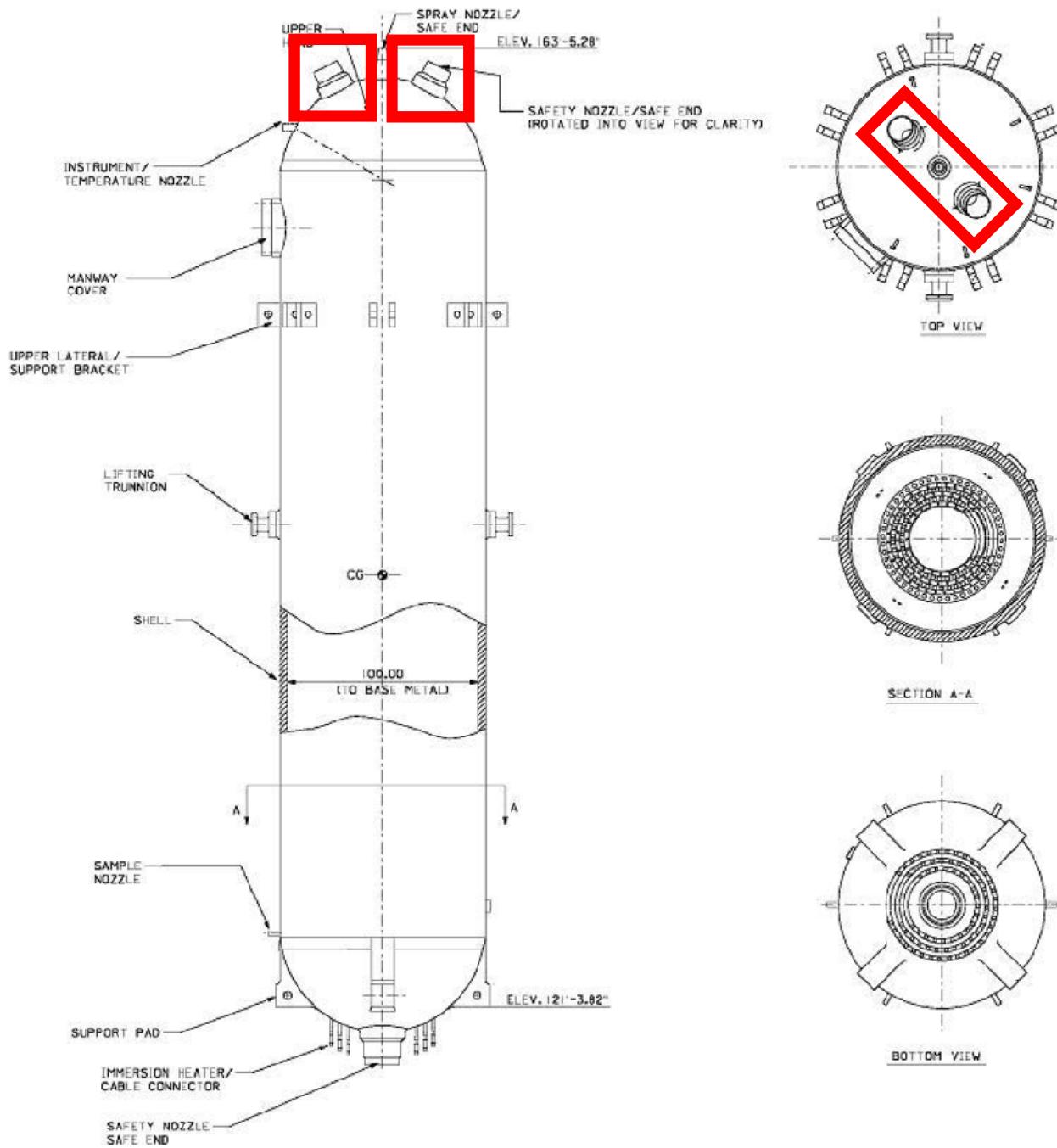


Fig. 3-8 PZR

➤ 2 nozzles for safety valves, ADS valves

Fig. 3-9 PZR Relief Module

Safety valves

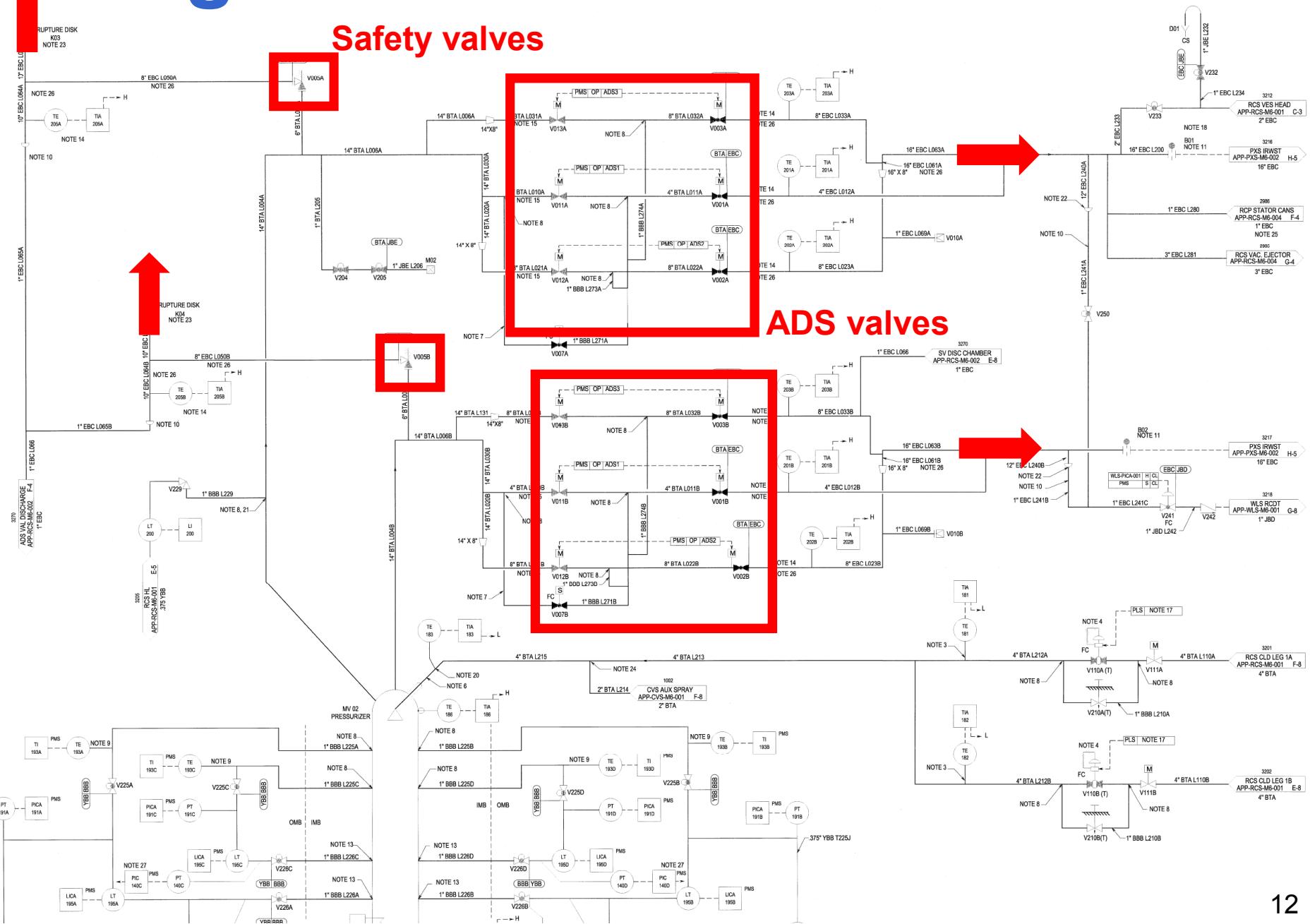


Fig. 3-9 PZR Relief Module



Safety valves

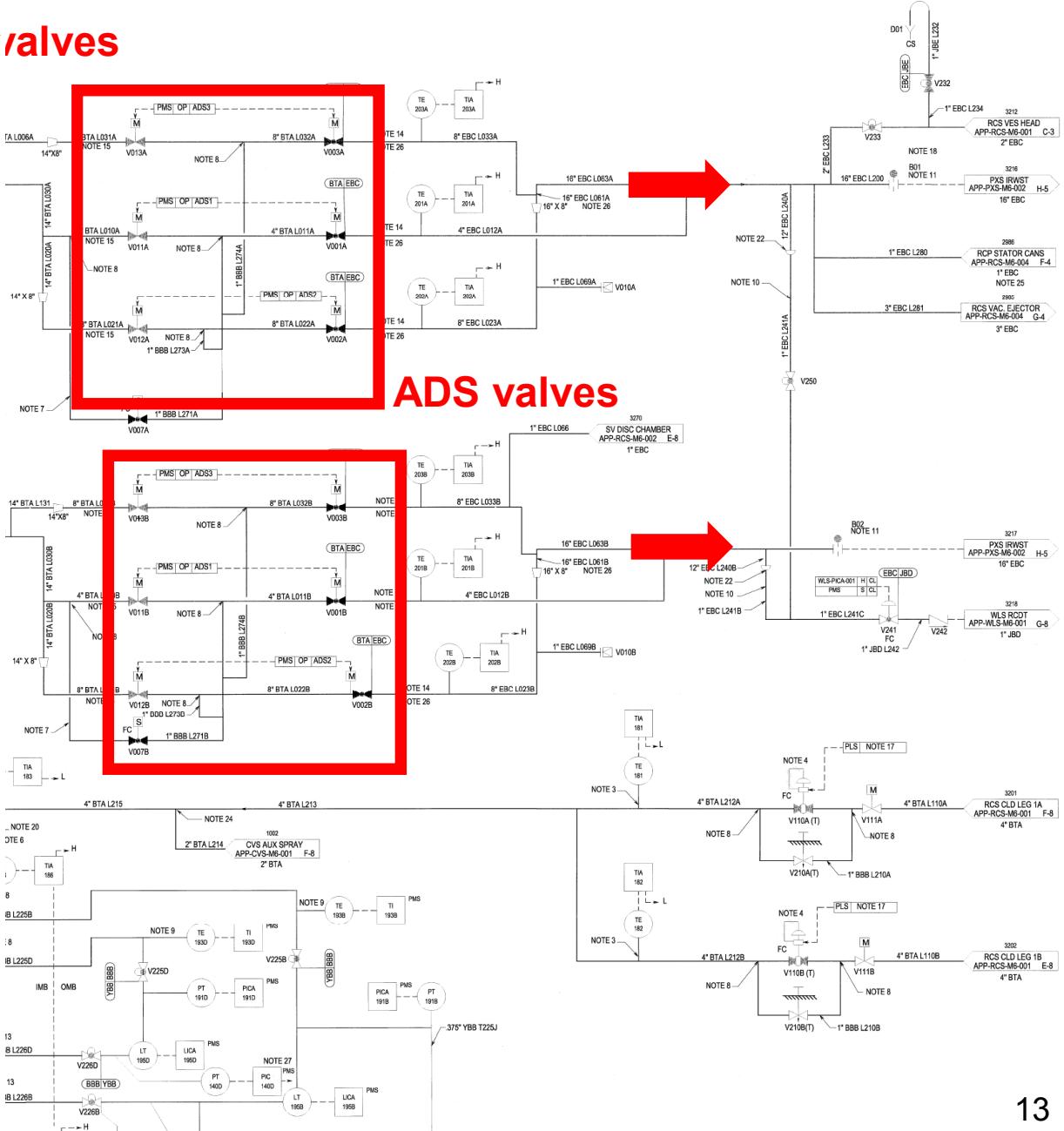
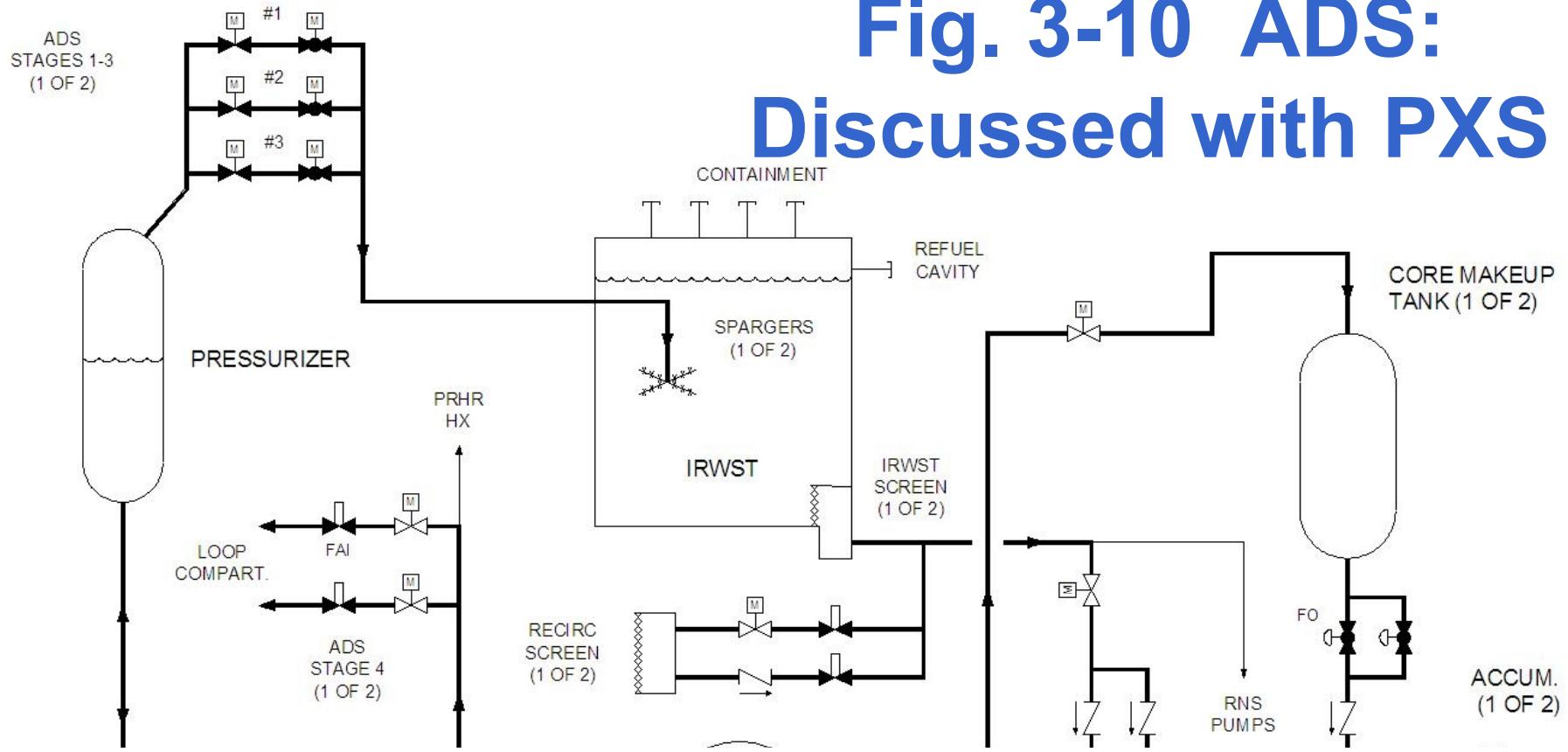


Fig. 3-10 ADS: Discussed with PXS



Purposes:

- **Depressurization of RCS to allow injection from some portions of PXS**
- **Removal of noncondensable gases from PZR steam space via 1st-stage valves**

Summary of Major Differences

- 2 RCPs/loop
- Canned-motor RCPs
- RCP suction nozzles welded directly to SG outlet nozzles
- ADS valves
- Vessel direct injection lines for safety injection
- PZR safety valves relieve to atmosphere

Review: A major difference between the AP1000 plant & existing Westinghouse plants is the use of...

- a. U-tube type steam generators.
- b. Canned-motor reactor coolant pumps.
- c. A pressurizer for RCS pressure control.
- d. Pressurizer safety valves.

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Review: Each reactor coolant pump takes a suction from...

- a. A steam generator outlet.
- b. Cold-leg piping.
- c. Hot-leg piping.
- d. A reactor vessel outlet nozzle.

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Review: Automatic depressurization valves are provided to...

- a. Vent the reactor vessel head.**
- b. Depressurize the RCS during cooldowns.**
- c. Serve as part of bleed and feed cooling of the core.**
- d. Depressurize the RCS to promote passive core cooling during accidents.**

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Review: Safety injection from the passive core cooling system is delivered to...

- a. The reactor vessel.**
- b. The cold legs.**
- c. The hot legs.**
- d. The reactor cavity.**

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